U. S. Bureau of Biological Survey

WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

FOREWORD

WILDLIFE REVIEW is established for the benefit of employes and cooperators of the Biological Survey. Its primary purpose is to abstract articles bearing on wildlife management. As it is impracticable to provide abstracts in such detail that they will serve as substitutes for the originals, an address will be given in each case from which the article, the periodical or other work in which it appeared, or possibly a reprint, may be obtained. Secondarily, brief informative sketches, bibliographies, and other useful features that fall within the limitations of a Federal mimeographed leaflet, will be presented.

The aim is to cover the field of wildlife management in a comprehensive manner. Because of some uncertainties and shortage of time connected with the first issue, however, the abstracts here given are not fully representative. Suggestions as to topics to be covered and as to other ways in which WILDLIFE REVIEW can be made more helpful will at all times be welcome. Contributions of papers for abstracting, especially of those appearing in separate form, or in the less familiar periodicals are invited. All communications should be addressed to WILDLIFE REVIEW, Biological Survey, U. S. Department of Agriculture, Washington, D. C.

It is intended to abstract all pertinent papers appearing from 1935 on and eventually to list the more important of previous publications. No regularity of issue is promised but the REVIEW will appear from time to time as the material on hand warrants. The distinctive heading will identify the leaflet, and the issues will be consecutively numbered, so that the completeness of sets can be checked.

Until further announcement, WILDLIFE REVIEW will be conducted by W. L. McAtee, principal biologist and technical adviser, Office of the Chief.

Washington, D. C. No. 1 September, 1935

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CONTENTS

	Page
Abstracts	
Conservation	2
Cycles	3
Disease	4
- Ecology	6
Education	9
Food habits	9
Life histories	11
Management	
Burning	12
Carrying capacity	13
Correlation of land uses	14
Developing projects	16
Erosion Control Service	16
Experimental harvesting of bobwhites	17
Farmer-sportsman relationships	17
Farm game	18
Feed patches	18
Forest game	18
Iowa's bobwhite plan	18
Judging range	19
- National Parks	19
New York's Annual Report	20
Preserving adequate breeding stock	20
Reforestation	20
Sanctuary values	21
Shooting losses	21
Shooting practices	21
Management--Continued	
White-tailed deer	21
Wildfowl refuge program	22
Wild turkey	22
Yellowstone elk	23
Propagation	
Battery brooding	23
Blue grouse	23
Chukar partridge	23
Cottontail	24
Dates of laying	24
Game farm fencing	24
Hen foster mothers	24
Mallard	25
Melanistic mutant pheasant	25
Natural versus artificial	25
Pheasant	25
Pheasant rearing costs	26
Prairie chicken	26
Production of pheasant eggs in winter	26
Ruffed grouse	26
Storing and shipping eggs	27
Tragopan pheasants	27
Wild turkey standards	27
Winter feeding	27
Wood duck	27
Restocking	28
Wildlife Research and Management Leaflets	29
Special articles	31

ABSTRACTS

Conservation

Ashbrook, Frank G. Fur scarcity through overtrapping impends; conservation needed, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 218-220.

The annual catch; fur decrease causing apprehension; need for protecting the breeding stock.

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Conservation

Connery, Robert H. Governmental problems in wildlife conservation (Columbia University Press, New York, N. Y., $3.25 a copy), 1935, 250 pp.

The changing place of wildlife in the national economy; the sphere of the federal, and of the state, governments in wildlife conservation; the organization and functions of the Biological Survey, the Bureau of Fisheries, and of the State conservation departments; proposals for reorganization of federal conservation agencies; problems of game law enforcement; conclusions and recommendations. The author believes in use with replacement. "There must be a new deal for the wildlife of America if the Nation is to save even a small part of this valuable natural resource." In a single phrase the greatest problem of conservation is how to protect the rights of the many against the greed of the few. Bibliography, 2 pages of which list books, 5, government reports, 1, articles and proceedings, 3, legislative enactments and executive orders, and 2, legal cases and opinions.

Conservation

Van Cleave, Harley J. Man meddles with nature, Scientific Monthly (The Science Press, Lancaster, Pa., 50 cents a copy) 40(4), April 1935, pp. 339-348.

Exploitation of American wildlife; changes due to alteration of environment; inefficiency of protecting and restocking activities; need of intelligent understanding before action. "No program of conservation can ever attain the full measure of its ends until complete recognition is given to the body of underlying scientific facts which elevate conservation from the ranks of the political system."

Conservation

Whipple, Gurth. A history of half a century of the management of the natural resources of the Empire State, 1885-1935 (Conservation Department, Albany, N. Y.), 1935, 199 pp., 14 Pls. (photos).

Contains sections on wildlife, restoration activities, game propagation, and game management as well as historical information on about all phases of conservation in New York State.

Cycles: Sun rhythms

Abbot, C. G. Solar radiation and weather studies, Smiths. Misc. Coll. (Smithsonian Institution, Washington, D. C.) 94(10), August 15, 1935, 89 pp., 3 Pls., 38 figs., 13 tables.

This contains the basic data on periodicity in solar phenomena that the serious student of cycles in wildlife populations must have. In briefest form the findings are that solar variation comprises 12 or more regular

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periodicities, all integral submultiples of 23 years. The same periodicities occur in weather and the inference is that solar changes influence weather. Various phenomena depending on weather show the influence of the 23-year cycle, including in biology, widths of tree rings and abundance of cod and mackerel.

Cycles: Wildlife and Solar rhythms

Wing, Leonard W. Wildlife cycles in relation to the sun, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 345-363, 20 figs.

Review of literature of which a bibliography of about 50 titles is presented. Points out cyclic nature of bird migration phenomena, and of variations in population of a variety of organisms and their good synchronization with phases of the sun. "The sun is the dominating factor in wildlife." The word "discovery" in the foreword by Leopold seems unjustified. One misses citation to the extensive studies of cyclic phenomena by Elton.

Disease

Allen, A. A. and P. P. Levine. A brief study of the willow ptarmigan and its relation to predators and the leucocytozoon disease, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 381-386.

Notes on studies in the Hudson Bay region; Leucocytozoon identified from ptarmigan; notes on parasites, predators, and cycles.

Disease

Cameron, Thomas W. M. Animal parasites and wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 412-417.

General discussion; confinement favors parasitism; methods of collection; possibility of control.

Disease

Clarke, C. H. D. The dying-off of ruffed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 402-405.

In Canada the die-off begins in the maritime provinces and from there progressos southward and westward. Chick mortality a great factor in decrease and this presumably due to a blood parasite, Leucocytozoon bonasae; available information on latter given.

Disease

Day, Albert M. and J. E. Shillinger. Predators and rodents are factors in the spread of disease, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 284-286.

Discussion of mammals in relation to tularemia, spotted fever, typhus fever, rabies, and bubonic plague, and role of the Biological Survey in control campaigns.

Disease

Frick, E. J. Diseases of wildlife, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(1), January 1935, p. 7.

General sketch; no remedies mentioned.

Disease

Green, R. G. and J. E. Shillinger. Progress report of wildlife disease studies for 1934, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 397-401.

Tularemia in relation to gray foxes and snowshoe hares; losses by age classes in hares; relationship of ticks to tularemia (Minnesota).

Disease

Jones, E. R. Diseases of game birds, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(3), March 1935, pp. 4-5, 10.

Captive birds; lists groups, the diseases identified in them at the Poultry Pathological Laboratory of the California State Department of Agriculture, Los Angeles, and gives suggestions for treatment and control.

Disease

Kalmbach, E. R. Botulism is a factor in the decrease of western wildfowl, U. S. Department of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 140-143, fig. 10 (photo).

Resume of losses; statement of distribution of the disease, sketch of the discovery of the cause, and suggested methods of combatting the malady.

Disease

Morley, R. C. Recent observations on game farm losses, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 232-237.

Discussion of blackhead, ulcerative enteritis (quail disease), and snuffles on game farms, and their control.

Disease

Saunders, G. B. Michigan's studies of sharp-tailed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 342-344.

Notes on the beginning of an investigation mostly on parasites, Leucocytozoon in the blood and Oxyspirura in the eyes.

Disease

Shillinger, J. E. Diagnosing disease in game, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 418-424.

Suggestions for recognizing diseases, for making autopsies, and for collecting, labelling, and shipping specimens.

Disease

Swales, W. E. Researches on liver fluke in deer, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 406-411.

Fascioloides magna: Intermediate hosts; life history; a normal parasite of deer, fatal only in heavy infestations; control. Bibliography of 5 titles.

Ecology: Animal relations to soils

Taylor, Walter P. Some animal relations to soils, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(2), April 1935, pp. 127-136.

Animal reactions on the environment, particularly the soil through accumulations of animal bodies or parts, materials for shelters, and stored food materials; soil packing; soil working; dam building and flooding, and promotion of, and prevention of, erosion. Bibliography.

Ecology: Beaver-trout relationships

Salyer, J. C. Preliminary report on the beaver-trout investigation, American Game (American Game Association, Investment Bldg., Washington, D.C., 25 cents a copy) 24(1), January-February 1935, pp. 6, 13-15, 1 photo.

Account of methods used in the investigation in Michigan; summary of research findings; suggestions for beaver-trout management.

Ecology: Carrying capacity determination

Stoddart, L. A. Range capacity determination, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(3), July 1935, pp. 531-533, 1 fig.

Utilization determined by counting grazed and ungrazed stalks on quadrats. Capacity then computed from number of animals known to have contributed to the ascertained percentage of utilization. The number of head for optimum use can then be calculated. Whether practicable for wildlife a question, as population must be known for at least one degree of utilization.

Ecology: Drainage operations

Uhler, F. M. and C. Cottam. Mosquito control and its effects on aquatic wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 291-294, 3 photos.

Protest against unnecessary drainage projects and suggestions for reducing interference with wildlife habitats in tidal marshes.

Ecology: Drainage operations

Vogt, Wm. Mosquito control and wildlife, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(3), May-June 1935, pp. 35, 42-43, 3 photos.

"Do present methods of control injure birdlife? The answer, with some qualifications, is, 'Yes'." Particulars are given relating to Long Island, N. Y. projects and also suggestions as to modification of methods and as to further study of the situation.

Ecology: Effects of drought

Errington, Paul L. The 1934 drought and southern Iowa bobwhite, Iowa Bird Life (Winthrop, Iowa, 15 cents a copy) 5(2), June 1935, pp. 18-20, 1 photo.

"By and large there seemed to be a rough correlation between the 1934 fall quail population and the length and intensity of the drought." Mortality may have been brought about by the drought impairing hatchability of eggs, through lack of dew and other readily available water, and through shortage of food and cover.

Ecology: Environmental changes affecting duck nesting

Bennett, Logan J. A comparison of two Iowa duck nesting seasons, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 277-282.

In 1933 with favorable weather and normal grazing and mowing practices an 86 percent hatch occurred. In 1934 with drought, flooding, early mowing and over-pasturing, only a 36 percent hatch resulted. Where cover is adequate losses to natural enemies are small. The majority of nests were found at from 10 to 200 yards of the water. The necessity of protecting nesting areas from grazing, mowing, and burning is urged, and the factors of a satisfactory wild duck breeding environment are listed.

Ecology: Erosion measurement

Weaver, J. E. and Wm. Noll. Measurement of run-off and soil erosion by a single investigator, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(1), January 1935, pp. 1-12, 3 figs., 4 tables.

Construction and use of interceptometer. Conclusions significant for wildlife management; "run-off without erosion may occur on land with a stabilized plant cover; x x x erosion usually increases with a decrease in plant cover, and is greatest from bared soil x x x; so far as possible men should keep a crop on his cultivated fields at all times."

Ecology: Mapping vegetation

Pearse, Kenneth, Jos. F. Pechanec, and G. D. Pickford. An improved pantograph for mapping vegetation, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(3), July 1935, pp. 529-530, 1 fig.

Complete specifications and instructions for construction may be obtained from the Intermountain Forest and Range Experiment Station, Ogden, Utah.

Ecology: Shortage of eelgrass

Cottam, Clarence. The eelgrass situation in 1934, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 295-301.

Review of conditions which, though generally improved, were found highly variable. Evidence as to cause of the great failure of eelgrass along our coast and also in European waters seems to point to a fungus disease. The bearing on wildlife management is that shortage of eelgrass was coincident with a great decrease in numbers of brant along the Atlantic Coast. The season for shooting these birds was abolished and can not safely be restored until the eelgrass recovers.

Ecology: Winter-killing of doves

Errington, Paul L. Winter-killing of mourning doves in Central Iowa, Wilson Bul. (Sioux City, Iowa, 60 cents a copy) 47(2), June 1935, pp. 159-160.

Flock with an abundant food supply (hemp) wiped out when heavy snow rendered the feed unavailable.

Education

Cornell University. Announcement of courses in Wildlife conservation and management for 1935-36 (Ithaca, N. Y.), Official Publ. 27(2), July 1935, 20 pp.

Calendar, staff and courses for 1935-36 and suggested four year curriculum, with opportunity for majoring in either ornithology, game-bird propagation, game management, economic zoology and animal ecology, or fisheries.

Food Habits

Martin, A. C. Quail-food plants of the Southeastern States, U. S. Dept. Agriculture Circ. (Supt. of Documents, Washington, D. C., 5 cents a copy) 348, 16 pp. (8 taken up by illustrations), April 1935.

Forty-six groups of plants ranked according to the percentage each contributed to the food of more than 2000 bobwhites from the Southeastern States. Brief notes on distribution, appearance, and food and cover value of the groups, and reproductions of excellent drawings by the author of typical parts, and seeds or fruits, of 28 species or groups of species.

Food Habits: Pheasant

Dalke, Paul D. Food of young pheasants in Michigan, American Game (American Game Association, Investment Bldg., Washington, D.C., 25 cents a copy) 24(3), May-June 1935, pp. 36, 43-46, 3 photos, 2 figs., 6 tables.

Report on crop contents of 138 young pheasants collected in connection with the Williamston Game Management Project in Michigan. Percentages of food items are based on dry weight, the technique of determining which is given. Feeding habits are described and the results of the food analysis presented in tables and graphs. The animal food, 90 percent in the first week, declines to 2 percent at about 10 to 12 weeks of age, being replaced by vegetable matter, chiefly cultivated grains. Variations in insect food according to the place of feeding and the relative importance of systematic groups are discussed as is also the general nature of the vegetable food.

Food Habits: Pheasant

Dalke, Paul D. Dropping analyses as an indication of pheasant food habits, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 387-391, 2 tables.

A report from the Williamston Michigan Game Management Project; methods of collection and study of the material described; important constituents listed and frequency of occurrence (grains, seeds, fruits, herbage, and insects) tabulated by months.

This paper embodies an attack upon the stomach analysis method of studying food habits. First it is said that the method is not "quantitatively significant." Statistically significant is meant as on the following page it is admitted that fecal analyses are "not suited to quantitative determinations." There is room for difference of opinion also on statistical significance; in one case in Biological Survey experience incorporation of data from about 200 stomachs from a single State with those for about 1000 stomachs of the same species from the United States, in general, did not change average results for any principal food group by as much as one percent. All of the other remarks critical of the stomach analysis are faulty for the same reason, namely, that it is not that that method itself is defective but that in case of the birds to which the method of fecal analysis can be applied, material can be obtained in more numerous samples and with greater regularity than it is practicable to collect stomach contents. This is true, however, of only a small proportion of our total number of bird species, so the criticism has no general validity.

Food Habits: Pheasant

Gigstead, Gill. Pheasant crop content report, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N.Y., 20 cents a copy) 39(4), April 1935, pp. 106-107.

Southeastern Wisconsin birds; items found in largest numbers were Spanish thistle, ragweed, hemp, blue bindweed, smartweed, and oats. Thirty-four items in all are listed. No bulk percentages are given and the identifications cited only by vernacular names in some cases may not be translatable into more definite nomenclature.

Food Habits: Relation to wildlife management

McAtee, W. L. Value of research into the food habits of wildlife - an excerpt from "Hearing before the Subcommittee of House Committee on Appropriations, in charge of the Agricultural Department Appropriation Bill for 1936". Reprint of pages 717-737 (obtainable from the Biological Survey, Washington, D. C.).

General statement by the author and quotations as to the value of food habits research from about 25 organizations and individuals, several of the latter class being wildlife managers. Paul L. Errington's contribution was separately published in Science 81 (2103), pp. 378-379, April 19, 1935.

Life Histories: Caribou

Murie, Olaus J. Alaska-Yukon caribou, U. S. Dept. Agr., Bur. Biological Survey N. A. Fauna 54 (Supt. Documents, Washington, D. C., 20 cents a copy), 93 pp., 10 Pls., 16 figs. June 1935.

The caribou in relation to man; status and abundance; limitations on numbers; details of appearance, senses, habits (much on food), distribution and migrations; taxonomy. Full bibliography. A report validated in every part by the great first-hand knowledge of the author.

Life Histories: Ruffed grouse

Bump, Gardiner. Ruffed grouse in New York State during the period of maximum abundance, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 364-369.

Report of progress on the fifth year of the investigation. Food again found not to be a limiting factor. Cover and its character very important; slashings induced nesting in long abandoned wooded areas. Evidence reported of local occurrence of two peaks in the period of a general cycle. Populations as high as a bird to the acre ascertained on a fifty acre tract. Where deliberately thinned out, population promptly restored by immigration and breeding. Predators while destructive have not prevented the birds from increasing up to maximum abundance. Discussion of parasites and possible retarding influence of severe hunting on spread of disease.

Life Histories: Sharp-tailed grouse

Snyder, L. L. A study of the sharp-tailed grouse, University of Toronto Studies (Toronto, Canada), Biol. Series No. 40, 66 pp., 4 Pls., 3 figs., 2 maps, 6 tables. 1935. (Received August 7.)

This paper inspired by the 1932 irruptive migration into southeastern Canada contains much of interest and possibly something of direct value to wildlife managers. The cyclic nature of the sharp-tailed grouse population is recognized, there being quite definitely an approximate 10-year cycle, and apparently also one of "something more than 30 years." The migration is described and mapped, habits briefly noted, and food of 51 winter-collected specimens tabulated. By bulk, catkins, buds, and twigs of birch made up 46.9 percent of the food, being taken by 88 percent of the birds, and fruit and twigs of mountain ash 17.9 percent, being taken by 51 percent of the individuals. Other buds and fruits, with some weed seeds and a trace of insects made up the remainder of the diet. The birds burrow into snow for roosting and lack of snow in cold weather may be one of the serious causes of mortality. Other factors frittering away the southern flight are discussed; the immigrants may survive a few years but not indefinitely south of the "normal" range. Various suggestions are made as to the immediate stimuli to migration, omitting however the "space factor" which may be important. There is a bibliography of 39 titles. A taxonomic discussion not satisfactorily completed in this paper is concluded in Occasional Papers of the Royal Ontario

Museum of Zoology (Toronto, Canada), No. 2, 9 pp., 1 map, 1 table, July 30, 1935, in which five subspecies (one new) plus one provisional, are described and their distribution mapped.

Life Histories: Variations in population, partridge

Middleton, A. D. The population of partridges (Perdix perdix) in 1933 and 1934 in Great Britain, Journ. An. Ecol. (Cambridge University Press, Fetter Lane, London, E. C. 4, England, 22 shillings 6 pence per copy) 4(1), May 1935, pp. 137-145, 5 tables.

After two years of disease and low numbers in 1931 and 1932, there was an increase in 1933 and 1934. The number of breeding birds was more than 35 percent greater in 1934 than in 1933. The number of young reared was, however, slightly less. Taking the gross totals of 42 estates, 53 percent more partridges were killed in 1934 than in 1933.

Management: Burning

Greene, S. W. Relation between winter grass fires and cattle grazing in the longleaf pine belt, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, pp. 338-341, 2 tables.

The author is Animal Husbandman in charge of the Coastal Plain Experiment Station of the Bureau of Animal Industry at McNeil, Miss. He has long been an intensive student of the interrelations of forestry, fire, and grazing and shows that the average gain of cattle on burned pasture was about 30 percent more than for those on unburned areas. The yield of forage grasses was more than twice as great, and native legumes were twice as abundant on burned as on unburned plots. The nutritive value of the grasses was considerably higher and soil fertility as represented by the proportions of nitrogen and of organic matter notably better on the burned tracts. To those with no previous acquaintance with these studies and especially to those who have had the long-accepted gospel about fire drilled into them, Mr. Greene's findings are amazing. They show, moreover, the necessity of studying all such problems in a thorough, scientific manner, a necessity of which most people interested in wildlife management, fortunately, are aware.

Management: Burning

Maissurow, D. K. Fire as a necessary factor in the perpetuation of white pine, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(4), April 1935, pp. 373-378, 1 table.

A study in Quebec, covering 150 years of uninterrupted development of virgin forest and 80 years during which logging was carried on, showed that practically every stand of white pine can be traced to burns. There is no reproduction under the canopy of the virgin forest and the pine apparently has perpetuated itself through the ages primarily through the medium of forest fires. Even though the findings for the Southeastern States (see the next preceding, and succeeding, abstracts) have received belated recognition

there has been a tendency to restrict their validity entirely to that section. The present paper shows that this is unjustified and may point the way to use of controlled burning by wildlife managers even in the northeastern forests.

Management: Burning

Stoddard, Herbert L. Use of fire on Southeastern game lands, Cooperative Quail Study Association (Sherwood Plantation, Thomasville, Ga.), 19 pp., January 15, 1935. Discussed by Wallace Grange with special reference to application of the findings in Northern States in Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(4), April 1935, pp. 96-97. In the Journal of Forestry (Society of Amer. Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, are seven papers on fire in relation to forestry in the Southeast, including that by Stoddard here referred to, and that by Greene abstracted above.

Confirmation by one who has paid more attention to the subject than anyone else of the recommendations as to use of fire in the Southeast that were contained in "The Bobwhite Quail, Its Habits, Preservation, and Increase" (1931). The present brochure is a plea for the carefully controlled periodic use of fire to maintain the proper density and distribution of cover primarily on quail preserves. Methods including mechanical outfits are described and the relation of fire to forestry fully discussed. It was remarkable to observe at the last meeting of the American Forestry Association, Washington, D. C., January 30, 1935, addressed by Stoddard on this subject, how largely the sentiment about the use of fire in the Southeast had changed from the almost unanimously condemnatory position that was taken in the early days of the Cooperative Quail Investigation, that is, about ten years before. This change has largely been due to careful study of the use of fire and conservative advocacy of the findings by Stoddard and the results of investigations (here abstracted) of S. W. Greene of the McNeil, Mississippi Experiment Station which proved that fertility both from a forestry and a grazing standpoint was better on burned than on unburned areas. In a section on the Relation of Burning to Ticks, Chiggers, and Disease, the belief is expressed that fire is beneficial in parasite control. The subject has not, however, been scientifically investigated.

Management: Carrying capacity for bobwhites

Errington, Paul L. Predators and the northern bobwhite, American Forests (Amer. Forestry Assoc., 1713 K St., N. W., Washington, D. C., 35 cents a copy) 41(1), January 1935, pp. 7-10, and 46, 4 photos. Reprinted in The American Field (222 W. Adams St., Chicago, Ill., 15 cents a copy) 124(37), September 14, 1935, pp. 244-246, 4 photos.

The Editor of American Forests says that for three vexed questions of wildlife conservation, (1) Does ordinary predator control do the game any good? (2) Does the shooting of surplus do the game any harm? and (3) Does it do any good to replant game without also improving food and cover conditions?, Errington's findings indicate that the answer is "No". The paper is a popular account of the author's studies on carrying capacity. It notes that surpluses above that capacity for any range disappear regardless of the particular

means through which reduction is accomplished. White man is the only predator efficient enough to reduce bobwhite populations much below the winter carrying capacity of the land; the harvesting of the actual surplus by early-season shooting is biologically sound.

Management: Carrying capacity for bobwhites

Errington, Paul L. What counts in northern bobwhite management, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 370-376.

The definiteness of carrying capacity of different environmental combinations is emphasized. The population of a given area can be only about so many and any surplus is sure to be reduced by one factor or another. Hence predation does not have the importance ordinarily attached to it. Effective northern bobwhite management consists in "(1) raising the normal carrying capacity of the land to a satisfactory level or maintaining it there, (2) strengthening individual coverts to protect against such emergencies as blizzards or sleet storms, and (3) wise regulation of hunting." The most difficult factor to control is the human one.

Management: Carrying capacity for pheasants

Dalke, Paul D. Carrying capacity of pheasant range, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(2), March-April 1935, pp. 23, 31-32, 1 photo.

Habitats were studied by a sampling method, the quantity of food produced estimated in quarts, bushels, and pounds per acre, and using 10.8 ounces of food per week per bird the carrying capacity of waste grains and of weed seeds per section computed for various periods. Fruits were ignored. Consumption of the same foods by other species is recognized but not measured. Food patches are necessary for maintaining the maximum population. This a theoretical rather than a practical study of carrying capacity.

Management: Correlation of land uses

Committee. Report on "Forests and their relation to game management", Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, pp. 273-275.

A brief but meaningful report on coordination of land uses, the theory of multiple use, the problem of isolated ranches, the trend of research and education, and on the need for well digested summaries of scientific findings for popular distribution.

Management: Correlation of land uses

Dutton, Walt L. Wildlife surveys and management plans on National Forest Lands, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 95-101.

Public ownership dictates the policy of multiple use; use without abuse results in correlation of the various interests; land-use policies of the Forest Service; wildlife surveys; research; manipulation of environment; control of gun harvest; diseases; sustained yield.

Management: Correlation of land uses

Frothingham, E. H. et al. Forest improvement measures for the southern Appalachians, U. S. Dept. Agr. Tech. Bul. 476 (Supt. Documents, Washington, D. C., 5 cents a copy), 45 pp., 9 figs. 5 tables and appendix of tables.

This bulletin contributes to an approach between foresters and wildlife managers by including a section (1 page) on "Measures designed to encourage game." It is acknowledged that "stand improvement operations in general will unavoidably reduce the quantity of game food." It is recommended that on better sites from 1-2, and on poorer from 5-10, crop trees per acre be sacrificed so as to leave room for game-food species. Remarks on the value of certain trees and shrubs for wildlife are commendable but classification of the species in the appendix is more illuminating. Shrubs and vines "that sometimes interfere with reproduction of desirable tree species" include alder, blackberry, blueberry, chinquapin, elder, grape, greenbrier, hazel, huckleberry, raspberry, rose, spice bush, striped maple, sumac, viburnum, and Virginia creeper, all valuable in producing food for wildlife. "Weed trees" practically worthless commercially and usually sacrificed in thinning operations include blue beech (Carpinus), pin cherry, crabapple, dogwood, hawthorn, holly, hop hornbeam, magnolia, mountain-ash, mulberry, sassafras, and service-berry, all food trees for wildlife.

The point most frequently at issue between foresters and wildlife managers, namely, as to the necessity of preserving openings and brushy areas, and of breaking up stands by lanes, slashings, or clearings so as to provide the maximum of forest margins, is not mentioned. Dominant canopy of merchantable trees is the forester's ideal (p. 16) but working for that condition means that wildlife can have only incidental and temporary tenure of habitat. With that handicap, wildlife can not be produced and maintained in satisfactory quantity. The reconcilement of forest management and wildlife management has a long way to go for it seems that neither can have what it wants except on a tract where its interests are paramount and its control supreme.

Management: Correlation of land uses

Miller, J. Paul. The correlation of game and forest management in New England, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 309-312, 1 table.

Points out reversion of lands for tax delinquency and possibility of making them productive of income from game and fur animals. Coordination of forest and game management essential; now being experimentally investigated by the Biological Survey and State Department of Forestry in New Hampshire. Notes on winter food of ruffed grouse adapted from Wildlife Research and Management Leaflet (BS-1, January 1935).

Management: Correlation of land uses

Silcox, F. A. Wildlife management and the national forests, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 166-172.

National Forests comprise 75 percent of the big game ranges of the western United States. Game animals increased 100 percent on the forests between 1921 and 1933. Multiple use; improvement of environment; regulation of animal populations to prevent overgrazing; providing maximum wildlife population compatible with other uses of forests; the object of Regulation G-20-A declaring wildlife of the Forests to be under jurisdiction of the Forest Service.

Management: Developing projects

Wight, H. M. The basic essentials for a farm game management survey and plan, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 87-94.

Game management should be an integral part of wildlife management and that an equally essential part of an all-around plan for land use. Reconnaissance of areas; detailed surveys of characteristics; correlation of land uses; preparation of plans for management; cover mapping; wildlife surveys, improving environment; counting wildlife. Bibliography.

Management: By Erosion Control Service

Holt, Ernest G. The Soil Erosion Service and wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 319-325.

Cites destructiveness of soil erosion, outlines aims of the Service, including improvement of environment for wildlife. Reports on a year's operations and results in Coon Valley, Wisconsin, where a 96 percent increase in quail was achieved. Wildlife policies of the Soil Erosion Service stated; no such word as "vermin" in its vocabulary.

Management: Experimental harvesting of bobwhites

Errington, Paul L. and F. N. Hamerstrom, Jr. Bobwhite winter survival on experimentally shot and unshot areas, Iowa State Coll. Journ. Sci. (Collegiate Press, Inc., Iowa State College, Ames, Iowa, $1.00 a copy) 9(4), 1935, pp. 625-639, 3 tables.

Comparison of population survival on 10 shot and 6 unshot areas, that on the former being 10.3 and that on the latter 28.3 percent, respectively, of their quail populations during the period of observation. The data show that reasonable shooting is biologically defensible; it can best be done in early fall when it will take part of the surplus that would not survive the winter anyway. Setting the number to be killed can be satisfactorily done only on the basis of expert appraisal of quail populations in relation to carrying capacity, and it must not be forgotten that due to crippling losses the number brought to bag does not represent the full toll of shooting.

Management: Farmer-sportsman relationships

Beck, Thomas and Arthur L. Clark. Connecticut plan of farmer-sportsman relationship, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 71-73.

Acquisition by the State through proceeds of bond issue of land, and leasing hunting rights to provide public shooting; also agreement with farmers for use of land in return for protection and game management.

Management: Farmer-sportsman relationships

Cowdery, Frank D. One way to replace our game, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(2), February 1935, p. 4, 1 photo.

Supplying seed stock and employing farmers to propagate pheasants; stresses need of sportsman-farmer cooperation.

Management: Farmer-sportsman relationships

Osborne, Lithgow. New York State's approach to the farmer-sportsman's problem, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 68-70.

State posts lands, requires hunters to ask permission to hunt, distributes pheasants and their eggs, provides public hunting grounds.

Management: Farmer-sportsman relationships

Warren, George C. Can free public shooting be continued?, Trans. 21st American Game Conference (American Game Assoc., Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 62-67.

Answers "yes" for New Jersey; farms posted by State partly as refuges, partly as shooting grounds; area stocked; attention given to enemies, food and cover; landholder controls number of hunters; establishment of public hunting areas begun.

Management: Farm game

Sheldon, H. P. Game as a farm crop emphasized by agricultural adjustment, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 220-221.

Reduction of crop acreage gives opportunity for increased game production; possibilities of revenue to farmers; suggestions on improvement of food and cover.

Management: Feed patches

Smith, Lawrence B. The value of coverts and feed patches, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(5), May 1935, pp. 122-123.

General notes on value; buckwheat valuable in some respects but does not furnish winter cover and is not advisable for sowing in mixtures; oats, barley, and sweetclover combination recommended, apparently for the Northeast.

Management: Forest game

Goldman, E. A. Game management and forest protection are related tasks, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 221-223.

Recognition by foresters of the value of wildlife; importance of forests to game; effects of overbrowsing; regulation of game populations.

Management: Iowa's bobwhite plan

Boone, W. C. Iowa's upland game management, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 56-67.

History of project; organization of personnel; 11 questions about bobwhite for which answers based on research are desired; procedure for setting

up and operating game management areas; head of game to be harvested set by game technician; farmers, who may charge reasonable fee, given hunting permit book and tags for the number of birds to be taken; report on one year's experience.

Management: Judging range

Wight, H. M. Evaluating the pheasant range, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 334-341, 3 tables, 12 maps.

Description of important elements of pheasant range, suggestions as to scoring their value, and examples of ratings illustrated by maps (Michigan).

Management: In National Parks

Wright, George M. and Ben H. Thompson. Wildlife management in the National Parks (Supt. of Documents, Washington, D. C., 20 cents a copy) 2, July 1934 (1935), 142 pp., 61 figs. (mostly photos).

Five papers (3 reprinted from The Condor) on perpetuation and utilization of primitive wildlife values; reports on the current status of large mammals in the National Parks, on wildlife restoration in four of the parks (including the elk and trumpeter swan problems of the Yellowstone); on overgrazing as a landscape problem; on research reserves; on buffer areas; and on wildlife management under emergency conservation work. High points: "When the Florida Everglades project is realized, either the visitor will have to bear the discomfort of mosquitoes or leave the swamps to the birds" (p. 6). Barring emergencies "the use of poison is now definitely prohibited within all parks" (p. 6). "The conclusion is undeniable that failure to maintain the natural status of national parks fauna in spite of the presence of large numbers of visitors would also be failure of the whole national parks idea" (p. 13). It was only a few years ago that "the principle of equal protection for all species was established" (p. 15). Hand-feeding and taming of animals to be discouraged; "the city zoo can satisfy this sort of human craving" (p. 23). "Species predatory upon fish shall be allowed to continue in normal numbers and to share normally in the benefits of fish culture" (p. 33). "Wild game prospers more if permitted to remain primitive. The mere presence of man is not so injurious. It is when he attempts to have the animals live his way and die his way that ruin follows" (pp. 36-37). "More of the wild animal background should enter into wildlife administration to the exclusion of ideas rooted in centuries of association with domestic livestock" (p. 38). "We can not stress the value of one animal at the expense of another, for if we do our lopsided vision is reflected in poor management which wrecks the whole organic wilderness" (p. 52). Cougars: "Their absence is responsible for many of our game problems" (p. 71). Wolves: Their "loss is lamentable and there is little likelihood that it can be remedied" (p. 71). "Predators at last have attained equal protection with other forms" (p. 72). Yellowstone elk: Danger to their existence "can be averted at present only by reducing the elk to about half their present number" (p. 87).

Management: New York's Annual Report

Osborne, Lithgow. State of New York Conservation Department, Twenty-fourth Annual Report for the year 1934 (Albany, N. Y.), 1935, 429 pp., illus.

Of interest to wildlife managers is the section (pp. 272-321) devoted to the Bureau of Game. It contains the annual report on: the Ruffed Grouse Investigation (formerly issued in separate form, but not so handled in 1933 and 1934); the breeding cycle of the ruffed grouse and propagation of the species in captivity; experimental work on incubation of the eggs of pheasants and quail; nutrition of growing birds of these species; deer studies (elsewhere abstracted in this issue of WILDLIFE REVIEW); pathological examinations of a great variety of species; effects on alterations in environment of game species; distribution; and take of game; also reports of operations of the State game farms and refuges. Experimental work and application of scientific findings have a gratifyingly large place in the operations of the New York Bureau of Game.

Management: Preserving adequate breeding stock

Preble, Edward A. Waterfowl breeding grounds of Canada, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(2), March-April 1935, pp. 20, 26-27, 2 maps, 1 fig. Essentially the same material is presented also as, Waterfowl breeding grounds of far north now poorly tenanted, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey, pp. 326-328.

Emphasizes destruction of southern breeding areas of waterfowl in contrast to the practically undisturbed condition of the northern area. Describes latter; estimates 85 percent of all our wildfowl are now reared there, while 75 percent of the total killing is done in the United States. Northern areas are not now occupied to capacity, and our duty is to send back a yearly increasing stock so that they will be fully utilized.

Management: Reforestation in relation to wildlife

Edminster, Frank C. The effect of reforestation on game, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 313-318, 2 tables.

Studies on 13 to 16 year old pine plantations and adjoining natural forest growth in eastern New York showed ruffed grouse much more abundant on the natural, and rabbits on the reforested, area in summer. In winter, grouse, rabbits, and deer were in greater abundance on the reforested area and squirrels on the natural. Closer analysis showed that it is only the marginal portion of the reforestation that is used, the interior being barren of wildlife. It is recommended therefore that coniferous plantations be not more than 600 (preferably 400) feet in diameter and that they be separated by plantings of hardwoods and food-bearing shrubs and interspersed by open lands.

Management: Sanctuary values

Pirnie, Miles D. Sanctuary values, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 302-304.

Suggestions apparently resulting from the writer's experience at the Kellogg Sanctuary in Michigan, chiefly as to the location, qualification, and management of waterfowl refuges.

Management: Shooting losses

Moffitt, James. Waterfowl shooting losses indicated by banding returns, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 305-308.

The 12 percent first year, and possible 25 percent aggregate, returns may represent not more than half the banded waterfowl actually killed by hunters. Points out that geese are exposed to 3 or more seasons of shooting before they begin to breed and that the losses are, therefore, more serious than in the case of the earlier maturing wild ducks. Advocates continued intensive banding investigations.

Management: Shooting practices

Cottam, Clarence. Waterfowl problems clarified by study of gunning practices, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 328-330.

Discussion of baiting, repeating guns, decoys, and battery shooting in relation to waterfowl protection.

Management: White-tailed deer, winter foods and feeding

Maynard, L. A., Gardiner Bump, Robert Darrow, and J. C. Woodward. Food preferences and requirements of the white-tailed deer in New York State, New York State Conservation Department (Albany, N. Y.) and New York State College of Agriculture (Ithaca, N. Y.) Joint Bul. No. 1, January 1935, 35 pp., 5 photos, 7 tables. Preliminary report under same title preceded by words "A study of the", by Robert Darrow, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 392-396.

A commendable feature of this investigation was collaboration of experts in animal nutrition with wildlife technicians. The nutritive requirements of animals in the wild were found comparable with those of domestic stock and as there are experts on the nutrition of the latter group available at various Agricultural Experiment Stations, the possibility of carrying on there similar adequate dietary investigations in connection with wildlife problems is distinctly indicated. In the present case winter tests of various foods were made in 1-1/2 acre pens under nearly natural conditions; browse in variety

(white cedar, white and yellow birch, soft maple) and also alfalfa hay were found to maintain the deer with only slight loss of weight. Beaver meadow hay proved unpalatable, regardless of quality, and when fed exclusively resulted in rapid loss of condition. Balsam was found to be a poor, and white cedar a good, type of browse, with hemlock intermediate. A table is given showing the relative preferences of captive deer for various browse species. Water requirements were found so low as to indicate that lack of open water probably is not dangerous in the winter environment so long as snow is available. Various physiological studies of captive deer are reported on, as well as the development of a concentrated food for emergency use in the wild. The product adopted was a 45-55 combination of cane molasses and coarse soybean meal, sealed in tin in 25 pound cakes in which wires for attachment had been incorporated. When exposed in browse to which wild deer were attracted the cakes were well accepted; experiments with captives showed a satisfactory degree of digestibility. A surprising statement is that a clause in the State Constituion prohibits the cutting of even a single tree to prevent starvation - an instance of conservation over-ripe. For experimenters the characteristic inadequacy of single foods needs to be kept in mind and for wildlife feeders the dangers of intensifying parasitic infestations as well as the evils of any degree of domestication of the wild stock. The National Park Service reports in the case of the Yellowstone elk herd that artificial feeding has proved so much more harmful than beneficial that it must be discontinued as soon as possible. (See Fauna of the National Parks, No. 2, also abstracted in this issue of WILDLIFE REVIEW.)

Management: Wildfowl refuge program

Dieffenbach, Rudolph. Waterfowl-restoration program undertaken by the government, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 330-331.

Progress of land acquisition campaign and general outline of refuge development program.

Management: Wild turkey

Stoddard, Herbert L. Wild turkey management, Cooperative Quail Study Association (Sherwood Plantation, Thomasville, Ga.), 11 pp., April 8, 1935. Substantially the same account as previously appeared in Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 326-333, in American Game (same address, 25 cents a copy) 24(2), March-April 1935, pp. 22, 29-30, 2 photos, and in Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, pp. 153-154, 174-175, 1 photo.

This report by the Director of the Cooperative Quail Study Association, according to his statement, is a discussion of "methods of wild turkey management developed through trial and error." Even so it presents more on its subject than has ever been available elsewhere and is correspondingly welcome.

The results summarized are those obtained on "scores of Southeastern game preserves during recent years." Size of area needed; saturation point (apparently not definite as for bobwhite); purity of stock; control of enemies; available information on parasites and diseases; food and cover requirements; planting for wild turkeys; and artificial feeding are the topics covered.

Management: Yellowstone elk

Baggley, George F. Federal Elk Commission report, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 184-187.

Brief account of the Northern Yellowstone Herd, its artificial feeding since 1895, present numbers, necessity for reduction and recommendation of methods.

Propagation: Battery brooding

Petty, Uel N. Battery brooding bobwhite chicks, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 224-225.

Account of experiment with battery brooding which is not recommended for present trial on a large scale, though the author plans to continue experimentation (Oklahoma).

Propagation: Blue grouse

Simpson, Gene. Breeding blue grouse in captivity, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 218-219.

From four pairs 43 eggs were obtained, 33 hatched under bantams and 22 birds were reared to maturity. The rearing coops were kept in a natural environment and much natural food was given.

Propagation: Chukar partridge

Bade, August. Mr. Chukar - now naturalized Californian, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(5), May 1935, pp. 118, 143, 1 photo.

Released in 18 California counties, known to be well established in two; brief notes on artificial propagation; as high as 112 hatchable eggs obtained from a single female in a season; young easily brooded artificially.

Propagation: Chukar partridge

Bentley, B. Howard. "A wonderful bird is the x x x", Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(5), May 1935, pp. 4-5, 11, 1 photo.

Chukar partridge; brief notes on appearance and native home; status in Pacific Coast States; pens; sanitation; propagating methods; care of young; feeding, including formulas for mashes and grain food mixtures; prices.

Propagation: Cottontail

Gerstell, Richard. Pennsylvania's experiments in the propagation of cottontail rabbits, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 226-231.

Experiments with a range system under different environments and with varying proportions of the sexes demonstrated that at best the produce of one doe will not exceed 6 young reared to maturity per season, and that even with supplemental feeding not more than 40 rabbits can be kept on an acre of land over an extended period. The need of a controlled system of propagation is stressed, and further experimentation planned. Losses from predators, diseases, and other causes are briefly discussed.

Propagation: Dates of laying

Denley, Charles F. Dates birds started to lay and averages for four years, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 25 W. State St., Doylestown, Pa., 25 cents a copy) 5(7), July 1935, p. 9.

Relates to captives mostly of the pheasant family, but is an interesting collection of data the like of which is not publicly available elsewhere. Notes on 26 species.

Propagation: Game farm fencing

Anon. Game farm fencing, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(5), May 1935, p. 8.

Suggestions as to posts, gates, material, and erection of fences.

Propagation: Hen foster mothers and their care

Rockwell, M. J. The foster mother, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), Pt. 1, 5(4), April 1935, pp. 8, 10; Pt. 2, 5(5), May 1935, pp. 1, 11; Pt. 3, 5(6), June 1935, p. 1; Pt. 4, 5(7), July 1935, p. 1.

Pt. 1, objections to large breeds and feather-legged varieties; use of bantams, silkies; Pt. 2, freeing prospective brooders from parasites, vices; sites for nests; boxes; number of eggs to a setting; Pt. 3, care of setting hen and nest; Pt. 4, hatching time; early care of young.

Propagation: Mallard

Grange, Wallace. Handling wild mallards in captivity; Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(8), August 1935, pp. 210-211, 1 photo.

Importance of selection, handling in small units rather than in flocks, character of environment, and of training, in preserving wild conformation and reactions.

Propagation: Melanistic mutant pheasant

Jurale, Bernard. The scientific side of mutant breeding, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(8), August 1935, pp. 207, 223, 1 photo.

A discussion of the melanistic mutant of the ringnecked pheasant in the light of Mendel's laws of heredity. Vital statement: "The original mutant was lost, and the birds imported were, without doubt, hybrids because the offspring did not breed true but produced all types of variations, in color, size, etc."

Propagation: Natural versus artificial

Lovejoy, P. S. Natural as against artificial propagation, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 74-83.

Condemns the use of uninformed and wasteful methods; gives due credit to restocking operations but points out disadvantages; and strongly urges working with habitats, ecologies, and environmental controls.

Propagation: Pheasant

Jeffreys, George A. Raising pheasants on wire floors, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(3), March 1935, pp. 66-67, 82.

Description of pens, brooders, brooding and feeding system under conditions requiring that all dietary elements be artificially provided.

Propagation: Pheasant

Young, Mrs. C. P. The California system of propagating the ringneck pheasant, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(9), September 1935, pp. 4-5, and 9-10, 1 photo.

Description of pens, battery setting nests, brooding coops, feeding, and methods of handling in a typical backyard system; also importance of record keeping.

Propagation: Pheasant rearing costs

Callenbach, E. W. and R. R. Murphy. The cost of producing ringneck pheasants, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 204-212, 9 tables.

All costs including initial outlay for day-old chicks, brooder houses, brooders, fencing, food, labor, etc. involved in rearing birds to 28 weeks of age reckoned and distributed according to items and weeks. Formulas are given for 24 and 20 percent protein mashes and for the grain mixture used. The actual cost per bird for the whole period was $1.55 but this figure might not be applicable elsewhere because of local variation in prices; moreover it covers equipment that could be used for years and would serve materially to reduce costs of the second and following years.

Propagation: Prairie chicken

Handley, Chas. O. Raising prairie chickens in captivity, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 220-223.

Account of success in Virginia by W. B. Coleman, the well known quail breeder, in rearing prairie chickens from eggs produced in captivity. Out of 23 eggs obtained from a pair reared in captivity, 16 hatched and 8 birds were raised to maturity. Modern quail rearing equipment was used. Rickets developed in birds fed skimmed milk clabber, but not in those given whole milk clabber. Feeding methods described. In discussion Dan Ramey gave an account of rearing prairie chickens from wild collected eggs at the Kansas State Quail Farm; grasshoppers were found to be an excellent food for the young chicks.

Propagation: Production of pheasant eggs in winter

Martin, Lewis E. Pheasant eggs in winter, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(4), April 1935, p. 95.

Birds kept continuously under light, either daylight or artificial, began laying in January and soon proceeded at the normal rate; discussion of causes of early infertility, later overcome; diet.

Propagation: Ruffed grouse

Bump, Gardiner. Recent developments in the rearing of ruffed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 213-217, 1 table.

Artificial incubation of the eggs, reversion to the wild of liberated pen-raised birds, and carrying stocks of breeders over winter are regarded as solved problems. Increase in egg production and in fertility of the eggs is highly to be desired, but may be obtainable only through a long process of

selective breeding. Largest number of eggs laid by a captive female in a season, 27. A rather inflexible breeding cycle in males interferes with fertilization under game farm conditions. Keeping the birds on wire is desirable in preventing disease but results in a high proportion of infertile eggs and lower hatchability of fertile eggs.

Propagation: Storing and shipping eggs

Rockwell, M. J. Storing and shipping eggs for hatching, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(4), April 1935, pp. 4-5.

Best storage temperature about 50° F.; discussion of temperatures and humidity; egg cleaning; turning; directions for packing and shipping.

Propagation: Tragopan pheasants

Denley, Charles F. The Tragopan pheasants, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(9), September 1935, p. 5, cover illus.

Notes from his experience on the care of these birds; some infertility of eggs a drawback; 8 to 16 laid per season; pneumonia the most serious malady; suggestions on feeding.

Propagation: Wild turkey standards

Pirnie, M. D. Wild turkey standards, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 260-262.

Discussion of some of the "points" and suggestions for preserving wild conformation and behavior.

Propagation: Winter feeding

Rockwell, M. J. Feeding "greens" in winter, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(1), January 1935, p. 10.

Discussion of value, and use in feeding captive game birds, of dehydrated spinach, alfalfa and alfalfa meal, lettuce, carrots, mangels, and apples.

Propagation: Wood duck

Gorton, G. R. The beautiful Aix sponsa, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(8), August 1935, pp. 4-5, 1 photo.

A hardy, quiet bird tolerant of other species. Equipment and feeding for small scale rearing (California).

Restocking: Day-old bobwhite planting

Hart, Dennis. Restocking with day-old quail, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 241-245.

Maintenance of suitable refuge and nesting cover is stressed; planting of day-old chicks by the cock-adoption or by the bantam-fostering methods is described (New Jersey).

Restocking: Day-old pheasant chick distribution

Holm, E. R. What the commercial breeder can learn from New York's day-old chick program, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 238-240.

Under pheasant egg distribution one egg in five produced a bird of liberatable age; under day-old chick distribution the proportion is 1 to 2 and is thought susceptible of improvement. The advantages to commercial breeders from whom eggs or chicks are purchased, and the desirability of improving quality of these products is pointed out.

Restocking: Differential for exotics and natives

Ligon, J. Stokley. A new deal for native game, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, pp. 152, 172-173.

Deplores destruction of environment and introduction of exotic game; suggests as a partial remedy for the existing situation devoting farms and other environment that presumably will remain in an unnatural condition to introduced game, and reserving and safeguarding natural environment for native species.

Restocking: Introduction of wood pigeon

Canfield, George D. The British wood pigeon for America, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, p. 155.

Arguments for introduction of this species, which are mildly criticized by the editor. The undesirability of introducing this bird in view of its destructive food habits is pointed out by Phoebe Knappen in the following issue (39(7), July 1935, p. 189).

Restocking: Mountain sheep

Grinnell, Joseph. A way to "bring back" the native bighorn to the Yosemite, Sierra Club Bul. (Sierra Club, 402 Mills Bldg., San Francisco, Calif., 75 cents a copy) 20, 1935, pp. 28-31.

Maintain a corridor, free of domestic sheep, continuously from the Mount Humphreys district where bighorns of the proper subspecies are known to persist, along the crest of the Sierras to the Yosemite National Park, and await natural infiltration. Opposes introduction of the Rocky Mountain subspecies.

Restocking: Planting bobwhites

Hart, Dennis. Liberating quail chicks with bantams, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(3), March 1935, pp. 62-63, 76.

Selection, preparation, and planting of covey ranges, and liberation thereon of newly hatched broods in charge of bantams, the latter afterwards caught up; feeds and feeding methods.

Restocking: Survival of planted bobwhites

Handley, Chas. O. The survival of liberated bobwhite quail, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 377-380.

Study of this subject seems very necessary but those who have carried it on feel that the results do not tell the true story of survival. In Virginia during three seasons' work with wild-trapped birds 13.33 percent were trapped approximately one year after their release, and of 237 captivity-reared quail released in 1930, 28.69 percent were retrapped or otherwise accounted for in a period of about three years. Nevertheless the writer thinks that captivity-reared quail are not especially handicapped in comparison to the wild. Returns, says the abstracter, though below expectations, possibly are an approximate indication of survival, for there is a great overturn in bobwhite populations, and habitats simply will not support and hold more than appropriate numbers regardless of how many additional birds may be dumped into them. In this regard see Errington's papers on carrying capacity.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

The Biological Survey has instituted a new series of mimeographed leaflets under the above heading known as the BS Series which in time will replace the previous series known as Bi Information Leaflets. A list of those issued to date that are of interest in connection with wildlife management is given below. Copies of these leaflets can be obtained upon application to the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-1. Winter Food of Ruffed Grouse in New York, by Leon H. Kelso, January 1935, 3 pp.

Tabulation of percentage by bulk of principal items and discussion of their value.

BS-3. The Present Situation Regarding Eelgrass (Zostera marina), by Clarence Cottam, February 1935, 7 pp.

History and extent of eelgrass disappearance, cause of the malady, effects of disappearance, past periods of scarcity, and present conditions.

BS-5. Tularemia, an Animal-borne Disease, by W. B. Bell and J. E. Shillinger, April 1935, 3 pp.

Nature and history of the disease, symptoms in man, symptoms in wild rabbits, and other animals known to be susceptible, protective measures, and quarantine.

BS-9. Infectious Diseases as a Cause of Loss in Wildlife, by J. E. Shillinger, May 1935, 4 pp.

Discussion of diseases, particularly in relation to cyclic fluctuations in animal populations. Bibliography of six titles.

BS-12. The Present Plight of the Jackson Hole Elk, by H. P. Sheldon, Olaus J. Murie, and W. E. Crouch, July 1935, 4 pp., 1 map.

Elk a last remnant of old times, Jackson Hole a recreation area, elk problem is lack of winter range, winter feeding degrades the magnificent elk, temporary measures costly, and permanent solution requires adequate range.

BS-13. Protecting Grain Crops from Damage by Wildfowl, by E. R. Kalmbach, September 1935, 8 pp.

Nature of complaints, obligations of the farmer, obligations of the Federal Government, and suggestions for crop protection.

BS-14. Planting for Wildlife in the Corn Belt, by W. L. McAtee, September 1935, 2 pp.

Suggestions for use of land taken out of corn production, especially in growing plants producing cover and food for wildlife.

BS-15. Planting for Wildlife in the Cotton Belt, by W. L. McAtee, September 1935, 2 pp.

Suggestions for use of land taken out of cotton production, especially in growing plants producing cover and food for wildlife.

BS-16. Bird Refuges and Big-game Preserves Administered by the Bureau of Biological Survey, August 1935, 7 pp., 1 map.

Location, designation, date established, acreage, chief species protected.

BS-17. Wildlife of the Atlantic Coast Salt Marshes, by W. L. McAtee, September 1935, 22 pp.

Zones of salt-marsh plants, plants of the zones and their value to wildlife; birds, and other wildlife.

SPECIAL ARTICLES

Gathering, storing and sowing a typical water plant - sago pondweed

Sago pondweed seeds are most easily gathered and subsequently handled if taken with a few inches of the top of the plant. Clipping these off from a boat is better than raking up masses of the plants and then separating the seeds. The clipped tops should be dropped in receptacles of cool water, and it may be desirable to use ice if they are exposed to heating by the sun for some hours.

Sago pondweed tubers occur both on the upper part of the plant and on the roots. Those growing among the foliage can be treated like seeds. Those on the roots are best gathered in quantity by spading up the soil containing them and carefully washing it in a sieve of about quarter-inch mesh. The tubers recovered should be placed in separate containers in cool water as suggested for seeds.

It is better to handle both seeds and tubers in small receptacles, than in large, to minimize risk of injury. The sprouts of the tubers, for instance, are easily broken. Small receptacles nesting in large containers with a common stock of water are advised and may be assembled as material locally available permits.

Storage should be at temperatures slightly above freezing (32° - 34°). Open-topped containers of wood, glazed earthenware, or other material so lined as to prevent chemical reaction with the water should be used. The seeds and tubers should be kept entirely submerged and, if necessary, loss of water made good from time to time. Artificial cold storage must be resorted to except where there is a long cold winter with temperatures low enough both at the time the material is gathered and again in spring to prevent either fermentation or germination. Where these conditions prevail the planting material can be kept under water and ice in burlap bags.

Material should not be removed from storage until all preparations for planting have been made, and then should be kept wet and cool until actually used. Some method of anchoring planted material should be used either by covering it up in holes in the bottom as in dry land planting, or embedding it in balls of stiff clay, or wrapping it in cheesecloth and weighting with any conveniently accessible objects, as stones, large nails, bolts, or the like.

In shallow water, wading and planting by hand is satisfactory. In deeper places, the prepared balls or bundles of planting material can be dropped from a boat or placed in a hole made with an oar, as convenient. Plant at the very beginning of the growing season, and, if practicable, when the minimum number of waterfowl is present.

Sampling Insect Populations

This subject may seem far afield for the wildlife manager but that is not the case. Dependable knowledge of the insect population of areas gives a basis of judging their comparative values as nurseries for young game birds, a factor of great importance both on the game farm and in connection with restocking operations.

Despite criticisms of the accuracy of the net-sweeping method, it may nevertheless be regarded as a useful indicator of various phases of insect population phenomena. It certainly suffices for rough comparisons of insect abundance on restricted areas. The sweeping should be done under similar conditions and the best way to insure this is to do it in as short a time as practicable on the areas to be compared. An insect net with capacious diameter, say 2 feet, should be used, the sweeps made of the same length, and at about the same height from the ground taking in as much as possible of the vegetation. From 6 to 9 sweeps, each travelling through about 8 feet of the vegetation, will give a good indication of the population.

The insects caught can be concentrated by "slatting" them into a corner of the net, killed by putting that corner in a large cyanide bottle, which should be corked for several minutes. The job can best be done, therefore, by having a separate net for each area to be sampled. (Addresses of dealers in insect nets and cyanide bottles may be obtained from WILDLIFE REVIEW.)

After the insects are quite dead they can be emptied into any handy receptacles and counted at leisure. The counting can be done with any desirable or practicable degree of detail. For wildlife management purposes no special knowledge of insects is required as enumeration of grasshoppers, caterpillars, other insects, and spiders will suffice. Caterpillars and spiders are important food for very young birds, and grasshoppers and miscellaneous insects for those of all stages from about a week on.

Papers which discuss various methods of sampling insect populations including net-sweeping and the statistical validity of the results, and which contain references to further articles are the following:

Gray, Harold E. and Alan E. Treloar. On the enumeration of insect populations by the method of net collection, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 14(4), October 1933, pp. 356-367, 1 fig. 6 tables.

Beall, Geoffrey. Study of arthropod populations by the method of sweeping (id.) 16(2), April 1935, pp. 216-225.